*This presentation is for illustrative and **general** educational purposes only and is not intended to substitute for the official MSHA Investigation Report analysis nor is it intended to provide the sole foundation, if any, for any related enforcement actions.*

GENERAL INFORMATION

Coal Mine Fatal Accident 2007-05 & 06

Operator: Tri-Star Mining, Inc.
Mine: Job #3
Accident Date: April 17,2007
Classification: Fall of Highwall
Location: Dist. 3, Allegany County, Maryland
Mine Type: Surface Coal Mine
Employment: 71
Production: 2,100 Tons/Day

ACCIDENT DESCRIPTION

On Tuesday, April 17, 2007, a 51-year old excavator operator and a 38-year old bulldozer operator, with 15 years and 2 years of mining experience respectively, were fatally injured when a highwall failed. Both miners were operating equipment beneath the highwall portion that failed. The failure measured approximately 230 feet high, 240 feet wide, and 40 feet deep. The work was being performed near old underground mine works.

ROOT CAUSE ANALYSIS

Root Cause: The ground control plan developed by the mine operator did not utilize prudent engineering design in that it failed to address the heavily deep mined Sewickley and Pittsburgh coal seams. The plan also failed to address the effect of mining with the highwall oriented parallel to the well defined dominant joint set. The current mining method did not provide a safe and stable highwall and spoil bank to protect the miners. The associated mine map did not show old underground mine workings.

Corrective Action: The mine operator revised the ground control plan for the mine on June 12, 2007. This change modified the plan using prudent engineering analysis in the design of the highwall. All employees were trained in the provisions of the new plan. Accurate and complete mine maps were developed.

ROOT CAUSE ANALYSIS

Root Cause: The daily examination program of the operator was inadequate. On the day of the accident, the examiner did not examine the entire work site or travel into the pit to examine the highwall face. An adequate examination would assure the miners of safe working conditions or removal from a hazardous area. Additionally, several previous examinations did not result in obvious hazards being reported, recorded, or eliminated.

Corrective Action: The operator must develop an examination program to conform to the regulatory requirements. Examinations must properly identify hazards, and ensure that hazards are recorded and corrected. Root causes of deficiencies in examinations should be considered when developing the program.

ROOT CAUSE ANALYSIS

***Root Cause*:** The training plans and safety program did not provide specific training to the miners or examiners in recognizing hazards related to subsidence and underground mine workings within a highwall, the effects of joint sets on highwall stability, or the combination of both.

***Corrective Action*:** The mine operator must revise the training plan and retrain the miners and examiners on highwall hazard recognition specific to the mine and the new ground control plan.

ENFORCEMENT ACTIONS

§104(d)(1) citation, No. 6604621, was issued to Tri-Star Mining, Inc. citing 30 CFR, section 77.1000.

Condition or Practice: The mine operator failed to establish and follow a ground control plan for safe control of highwalls, pits and spoil banks for the 001 Pit (Caledonia/419 Pit). The ground control plan was not consistent with prudent engineering design and did not insure safe working conditions due to the following: 1) Severe subsidence above both the Sewickley and Pittsburgh coal seams, resulting from extensive underground mining, caused the highwall to be extremely fractured, unstable, and were obvious. 2) Remnant pillar stubs in the Pittsburgh seam represented a severely weakened layer near the base of the highwall. 3) The segment of the highwall that failed was oriented nearly parallel to a well developed joint set. The combination of these three factors resulted in a very unstable highwall, causing failure. The mining methods employed and selected by the operator failed to insure highwall stability at the accident site.

ENFORCEMENT ACTIONS

§104(d)(1) citation, No. 6604621, continued

Condition or Practice:

Two surface miners were fatally injured when a massive surface coal mine highwall failure occurred on April 17, 2007, at the 001 Pit (Caledonia Pit/419 Pit). In addition to this d(1) citation, the operator did not exercise prudent engineering practices in providing an accurate mine map, Citation No. 6604619, and the mine map was not made or certified by an engineer or surveyor registered by the state of Maryland where the surface mine is located, Citation No. 6604620.

The mine operator was put on notice from a March 2002 ground control acknowledgement, that when surface operations intersect old underground works, extra care must be taken to assure the safety of miners working near the highwall. The mine operator failed to establish and follow a ground control plan for safe control of highwalls, pits and spoil banks for the 001 Pit (Caledonia/419 Pit) in response to the underground workings.

ENFORCEMENT ACTIONS

§104(d)(1) order, No. 7146873, was issued to Tri-Star Mining, Inc. citing 30 CFR, section 77.1713 (a).

Condition or Practice:

On April 17, 2007, an inadequate examination of the highwall and spoil bank above the active working areas was conducted in the 001 pit (Caledonia Pit/419 pit). Based upon information obtained in the fatal accident investigation, the highwall and spoil bank was not examined in its entirety. The foreman stated the highwall and spoil bank was only examined from the top of the highwall and not from the pit floor where the entire face of the highwall and spoil bank could be observed. The condition of the Pittsburgh seam pillar remnants, which are located in the highwall, is an important component of the highwall stability. The observation of the movement of these pillar remnants is an essential part of the highwall examination in areas where the Pittsburgh seam is exposed. The movement of these pillar remnants could not be adequately observed from the top of the highwall. Also tension cracks were observed above the highwall and were present within 150 feet of the highwall failure and represented a hazard to miners near the highwall.

The victims were working below an unstable spoil pile and the certified examiner did not travel to the pit floor active work area. Tension cracks were present above the victims on the spoil bank crest. This and other hazardous conditions were not reported to the operator or recorded on the examination record. A separate

ENFORCEMENT ACTIONS

§104(d)(1) order, No. 7146873, continued

Condition or Practice:

citation number 6604148 was issued for the failure to record hazards of an unstable highwall and unstable spoil bank, including tension cracks above the highwall and on the crest and slope of the spoil pile.

The spoil bank had failed the night before into the working area of the pit leaving a steep spoil slope of up to 60 degrees. In addition to the steepness of the slope there were scarps and cracking in the spoil bank above the active work areas creating hazardous working conditions below the spoil bank.
Two surface miners were fatally injured when a massive surface coal mine highwall failure occurred on April 17, 2007, at the 001 Pit (Caledonia Pit/419 Pit). To abate this citation, an updated training plan and training shall be conducted for all certified foreman and miners at Job #3 to recognize hazards associated with subsidence. The operator's training plans and safety program did not provide specific training to the miners or examiners in recognizing hazards related to subsidence and underground mine workings within a highwall, or the effects of joint sets on highwall stability.

ENFORCEMENT ACTIONS

§104(d) (1) Order, No. 6604622, was issued to Tri-Star Mining, Inc. citing 30 CFR, 77.1006(a)

Condition or Practice:

On April 17, 2007, the track excavator operator and the dozer operator were assigned and were working near a dangerous highwall and under a dangerous spoil bank in the 001 pit (Caledonia). The unstable highwall collapsed resulting in fatal injuries to the two equipment operators that were working in the pit below the highwall. The highwall was 275 feet high and the collapsed area was approximately 230 feet high, 240 feet wide, and up to 40 feet deep. A combination of the following factors made the highwall dangerous: loose and fractured rock from subsidence in numerous areas on both sides of the failure, joint set orientation along the highwall at the failure, lack of effective benching, remnant pillars that resulted in weakened strata, and the effects of seeping water.

ENFORCEMENT ACTIONS

§104(d) (1) Order, No. 6604622, continued

Condition or Practice:

The spoil bank had failed the night before into the working area of the pit leaving a steep spoil slope of up to 60 degrees. In addition to the steepness of the slope there were scarps and cracking in the spoil bank above the active work areas creating hazardous working conditions below the spoil bank.

The mine operator was put on notice from a March 2002 ground control acknowledgement, that when surface operations intersect old underground works, extra care must be taken to assure the safety of miners working near the highwall. The mine operator failed to establish and follow a ground control plan for safe control of highwalls, pits and spoil banks for the 001 Pit (Caledonia/419 Pit) in response to the underground workings.

This is being issued in conjunction with D-1 citation 6604621 and D-1 order 7146873 which also contributed to the accident.

BEST PRACTICES

- Develop ground control plans that specify remedial measures for adverse conditions such as those presented by old underground mines.
- Do not work near dangerous highwalls or banks and be aware of changing highwall conditions.
- Train examiners to recognize adverse conditions and environmental factors that can decrease stability.
- Involve front line supervisors when developing mining plans and apply prudent engineering principles to address normal and adverse conditions.